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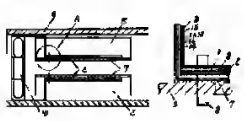
(71)Applicant : MATSUSHITA ELECTRIC IND CO LTD

(72)Inventor : YOSHIMOTO KOJI
ISHII KAZUNORI
TERAKADO MASAYUKI
HAYASHI TAKESHI

(54) GENERATING APPARATUS OF WARM AIR



(57)Abstract:

PURPOSE: To obtain a generating apparatus of warm air using a positive resistance temperature coefficient (hereinafter PTC) heater which has a long lifetime and is safe, by preventing occurrence of a strain which accompanies

thermal expansion and shrinkage of the PTC heater.

CONSTITUTION: A long PTC heater 4 which has a thin-type PTC resistor, a pair of electrodes 1 and 2 provided for impressing a voltage in the direction of the thickness of the resistor, terminals 11 and 12 for feeding and insulating layers 13 and 14 sealing these components hermetically, a radiator 5 which is joined to the heater by using an adhesive 7 and a fixing component 8 piercing the insulating layers 13 and 14 on the windward side and the radiator 5 and fixing them, a duct 9 in which these members are installed, and a blower 10 which sends air to the duct, are provided. The long PTC heater 4 is disposed in parallel to the direction of the air. Moreover, a hole being larger than the section of a part pierced by the fixing component 8 which can pierce the insulating layers 13 and 14 is provided in the radiator 5 and fixation is made by the fixing component 8 through the insulating layers 13 and 14 and on the opposite sides in the direction of the thickness of the radiator 5.

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CLAIMS

[Claim(s)]

[Claim 1] The forward temperature-coefficient-of-resistance resistor which consists of conductive impalpable powder and a crystalline polymer, and the electrode of the pair prepared in the thickness direction of said forward temperature-coefficient-of-resistance resistor that an electrical potential difference should be impressed, The forward temperature-coefficient-of-resistance heating element equipped with the insulating layer which seals the terminal for electric supply, and said forward temperature-coefficient-of-resistance resistor, said electrode and said terminal for electric supply to said electrode, The radiator combined with said forward temperature-coefficient-of-resistance heating element, and the duct which installs said forward temperature-coefficient-of-resistance heating element and said radiator inside, and forms an air course, It has ventilation equipment which ventilates from the end of said duct, and said forward temperature-coefficient-of-resistance heating element is arranged in parallel at a wind. For association with said forward temperature-coefficient-of-resistance heating element and said radiator The warm air

generator using the fixing component which pierces through the insulating layer in which said forward temperature-coefficient-of-resistance resistor of the binder between said forward temperature-coefficient-of-resistance heating elements and said radiators and the windward of said forward temperature-coefficient-of-resistance heating element, said electrode, and said terminal for electric supply do not exist, and said radiator, and is fixed.

[Claim 2] A fixing component is the warm air generator according to claim 1 which are the configuration which can be pierced through an insulating layer, and the quality of the material, prepared the bigger hole than the cross section of the part which said fixing component penetrates in the radiator, and was fixed by both sides of the thickness direction of said insulating layer and said radiator.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.**** shows the word which can not be translated.

3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the joint configuration of this forward temperature-coefficient-of-resistance heating element and radiator especially about the warm air generator which used the forward temperature-

coefficient-of-resistance heating element as a heat source.

[0002]

[Description of the Prior Art] The conventional forward temperature-coefficient-of-resistance heating element was a configuration as shown in JP,57-43995,B or JP,55-40161,B, and was that in which the autogenous regulation is carried out to proper temperature by the forward resistance temperature characteristic of the inter-electrode resistor of a pair. However, when big power flux density and high temperature are required especially, in order to make uniform the temperature distribution of the forward temperature-coefficient-of-resistance heating element itself and to prevent abnormalities, such as generating of a hot zone, it is indispensable to always make good the temperature distribution of the inter-electrode direction of a pair.

[0003] The approach of making the inter-electrode distance of a pair approach mutually, and constituting it, as shown in JP,62-59515,B or drawing 6 as the solution was devised. In drawing 6 , 1 and 2 are the electrodes of the pair which approached mutually and was prepared, and possibility that the forward temperature-coefficient-of-resistance heating element 4 of high power can be obtained is found out by arranging the forward temperature-coefficient-of-resistance resistor 3 which carried out mixed distribution and formed conductive impalpable powder in the crystalline polymer in the meantime. by combining this with a radiator 5 thermally in epoxy system resin 6 grade, as shown in drawing 7 , heat is efficiently radiated in a lot of heat outputted -- it can make -- in addition -- and there was also no possibility of exfoliating.

[0004]

[Problem(s) to be Solved by the Invention] However, with the above-mentioned conventional configuration, by the heat expansion and contraction of the forward temperature-coefficient-of-resistance heating element itself accompanying high power, the forward temperature-coefficient-of-resistance heating element 4 is in the condition which fixed completely to the radiator 5, distortion occurred in the forward temperature-coefficient-of-resistance resistor 3, abnormalities, such as a

hot zone, might occur by this distortion, or resistance deteriorates, and the life fall might be carried out, and abnormality overheating, generation of heat, etc. might be generated.

[0005] This invention solves the above-mentioned technical problem, generating of distortion by the forward temperature-coefficient-of-resistance resistor by heat expansion and contraction of the forward temperature-coefficient-of-resistance heating element itself is prevented, and it aims at offering the warm air generator using a long lasting and safe forward temperature-coefficient-of-resistance heating element.

[0006]

[Means for Solving the Problem] The forward temperature-coefficient-of-resistance resistor which consists of conductive impalpable powder and a crystalline polymer in order that this invention may attain the above-mentioned purpose, The electrode of the pair prepared in the thickness direction of said forward temperature-coefficient-of-resistance resistor that an electrical potential difference should be impressed, The forward temperature-coefficient-of-resistance heating element of the long picture equipped with the insulating layer which seals the terminal for electric supply, and said forward temperature-coefficient-of-resistance resistor, said electrode and said terminal for electric supply to said electrode, The radiator combined with said forward temperature-coefficient-of-resistance heating element, and the duct which installs said forward temperature-coefficient-of-resistance heating element and said radiator inside, and forms an air course, It has ventilation equipment which ventilates from the end of said duct, and said forward temperature-coefficient-of-resistance heating element is arranged in parallel at a wind. For association with said forward temperature-coefficient-of-resistance heating element and said radiator It is the configuration characterized by using the fixing component which pierces through the insulating layer in which said forward temperature-coefficient-of-resistance resistor of the binder between said forward temperature-coefficient-of-resistance heating elements and said radiators and the windward of said forward

temperature-coefficient-of-resistance heating element, said electrode, and said terminal for electric supply do not exist, and said radiator, and is fixed.

[0007] Furthermore, fixing components are the configuration which can be pierced through an insulating layer, and the quality of the material, prepare a bigger hole than the cross section of the part which said fixing component penetrates in a radiator, and fix it at the both ends of the thickness direction of said insulating layer and said radiator.

[0008]

[Function] This invention by having arranged the forward temperature-coefficient-of-resistance heating element in parallel at the wind, and having used the fixing component which pierces through a binder, and the insulating layer and radiator between a forward temperature-coefficient-of-resistance heating element and a radiator to association with a forward temperature-coefficient-of-resistance heating element and a radiator, and is fixed to it A binder absorbs deformation by heat expansion and contraction of the forward temperature-coefficient-of-resistance heating element itself. It is the part which does not almost have deformation by heat expansion and contraction of a windward of the forward temperature-coefficient-of-resistance heating element itself, and generating of distortion of a forward temperature-coefficient-of-resistance resistor is prevented, without exfoliating, since the part which exfoliation by the wind begins to generate is fixed.

[0009] Furthermore, since a fixing component is the configuration and the quality of the material which pierce through an insulating layer, a bigger hole than the cross section of the part which a fixing component penetrates can be prepared in a radiator, heat expansion and contraction of some of a forward temperature-coefficient-of-resistance heating element can be horizontally absorbed with the hole prepared in the radiator for the configuration fixed by both sides of the thickness direction of said insulating layer and said radiator and said insulating layer and said radiator are fixed by both sides of the thickness direction, it does not exfoliate.

[0010]

[Example] One example of this invention is explained with reference to a drawing below. The warm air generator of this example is a heating element unit configuration as had a heating element unit as shown in the perspective view of drawing 2 , and the transverse-plane sectional view of drawing 3 and shown in the front view of drawing 4 , and is a warm air generator as shown in the sectional view of drawing 1 . In drawing 2 and 3, 4 is the forward temperature-coefficient-of-resistance heating element of a long picture with a die length of 400mm, and it combines with the radiator 5 which consists of aluminum material with a binder 7, it fixes with a fixing component 8 in the part which does not almost have deformation by heat expansion and contraction of a windward of forward temperature-coefficient-of-resistance heating element 4 the very thing, and it constitutes a heating element unit. As shown in drawing 4 and 1, this heating element unit is constituted in two-step two trains, and it arranges in a duct 9, and to this forward temperature-coefficient-of-resistance heating element 4, with ventilation equipment 10, it ventilates and warm air is obtained from an end. In addition, parallel connection of each forward temperature-coefficient-of-resistance heating element 4 is carried out electrically.

[0011] In the above-mentioned configuration, it is structure as shown in drawing 5 , and furnace carbon black was used as conductive impalpable powder, and the forward temperature-coefficient-of-resistance heating element 4 used high density polyethylene as a crystalline polymer, it was processed as follows and created it. first, the JIKUMIRUPAOKI site which is organic peroxide, kneading furnace system carbon black 55wt% and high-density-polyethylene 45wt% -- high density polyethylene -- receiving -- 3wt(s)% -- it added, and after making crosslinking reaction complete by heat-treating, the grinding object with a mean particle diameter of 50 micrometers was obtained by frozen grinding. It fully kneaded and the resistor pellet was obtained so that homogeneity distribution of this grinding object might be carried out into high density polyethylene and a carbon black presentation ratio might become 35.5wt(s)% of the whole quantity.

In this way, process the obtained resistor pellet into a thin shape with a thickness of 0.4mm, and the forward temperature-coefficient-of-resistance resistor 3 is fabricated. Constitute the electrodes 1 and 2 of the pair prepared in the thickness direction that a seal of approval should be carried out, and it carries out each spot welding of the terminals 11 and 12 for electric supply to these electrodes 1 and 2 by three points. Furthermore, as a unification object with this forward temperature-coefficient-of-resistance resistor 3, electrodes 1 and 2, and the terminals 11 and 12 for electric supply is covered and sealed by the insulating layers 13 and 14 which consist of polyester film of 50-micrometer thickness and it is shown in drawing 1 next Stick on a radiator 5 with a binder 7, fix the part which does not almost have deformation by heat expansion and contraction of a windward of forward temperature-coefficient-of-resistance heating element 4 the very thing with a fixing component 8, and a heating element unit is constituted. The warm air generator was made to constitute so that the long forward temperature-coefficient-of-resistance heating element 4 may arrange in parallel in a wind.

[0012] Since the forward temperature-coefficient-of-resistance heating element 4 is a carbon-resin system according to the configuration of this example Since an electric supply part does not become complicated, but there is also flexibility, forward temperature-coefficient-of-resistance heating element 4 bridging is also easy, the electrode 1 of a pair and the distance between two approach mutually further and it is constituted, The electrode 1 of a pair and the temperature distribution of the direction between two were always able to become good, the output of the forward temperature-coefficient-of-resistance heating element 4 could be heightened considerably, and it was able to obtain per effective exoergic projected area to the high power value of about 13 W/cm2 (at the time of the early stages of energization). As shown in drawing 1 , the long forward temperature-coefficient-of-resistance heating element 4 is arranged in parallel at a wind. To association with the forward temperature-coefficient-of-resistance heating element 4 and a radiator 5 And the binder 7 between the forward

temperature-coefficient-of-resistance heating element 4 and a radiator 5, By having used the fixing component 8 which pierces through the insulating layers 13 and 14 and radiator 5 of a windward of said forward temperature-coefficient-of-resistance heating element 4, and is fixed A binder 7 absorbs deformation by the heat expansion and contraction of forward temperature-coefficient-of-resistance heating element 4 the very thing accompanying high power. It is fixing in the part which does not almost have deformation by heat expansion and contraction of partial [with few temperature changes of a windward], i.e., forward temperature-coefficient-of-resistance heating element, 4 the very thing. The warm air generator to the forward temperature-coefficient-of-resistance resistor 3 using [without having prevented generating of distortion and exfoliating] the long lasting and safe forward temperature-coefficient-of-resistance heating element 4 can be offered.

[0013] Moreover, by covering the forward temperature-coefficient-of-resistance heating element 4 whole with insulating layers 13 and 14, electric insulation area can be used only as forward temperature-coefficient-of-resistance heating element 4 part, and the safety to electrification, a short circuit, etc. can be raised. In addition, about insulating layers 13 and 14, it is a thing with the hot melt layers 15 and 16, and what carries out [what] vertical welding and is sealed in these hot melt layers 15 and 16 is good.

[0014] This warm air generator was actually energized in the room with a room temperature of 10 degrees C. the time of energization inrush -- about 2000 -- since the power of W enters and energizes -- after about 10 seconds -- about 1500 -- it was set to W, and warm air temperature exceeds 45 degrees C, it comes to sense warmth, power becomes 69 degrees C after 1 minute, and 827W and warm air temperature came to get warm enough. Finally, although warm air temperature was stabilized at 73 degrees C and power was stabilized in 730W Self-temperature control of the temperature of the forward temperature-coefficient-of-resistance heating element 4 at this time is carried out to about 100 degrees C. In this condition Even if airflow changes and wind-speed distribution

varies, without going up at 100 degrees C or more, the temperature in a duct 9 generates the warm air of uniform temperature in the power distribution which followed airflow and a wind speed, and is very safe.

[0015] Moreover, as shown in drawing 1 -4, the character type metal needle of KO is used for a fixing component 8 by this example. The tip of two metal needles with which this metal needle is concurrent is made into the sharp configuration which can be pierced through insulating layers 13 and 14. After the metal needle which prepares a bigger hole than the cross section of a metal needle in a radiator 5, bends to the both ends of a metal needle, and has the section has stuck to the radiator 5 (or insulating layers 13 and 14) If it is made the configuration which bends a metal needle along with insulating layers 13 and 14 (or radiator 5), and fixes the forward temperature-coefficient-of-resistance heating element 4 and a radiator 5 Since heat expansion and contraction of some of the forward temperature-coefficient-of-resistance heating element 4 can be horizontally absorbed with the hole prepared in the radiator 5 and insulating layers 13 and 14 and a radiator 5 are fixed by both sides of the thickness direction, it does not exfoliate. Furthermore, after not opening a hole in insulating layers 13 and 14 and setting the hole of insulating layers 13 and 14 and a radiator 5, a troublesome process becomes unnecessary [the configuration at the tip of the metal needle of a fixing component 8 is sharp, and], since piercing through insulating layers 13 and 14 is possible on the mass production of equipping with a fixing component 8. In addition, even if this is not the character type metal needle of KO, things cannot be overemphasized that what is necessary is just the fixing component 8 which it pierces through insulating layers 13 and 14, and can fix the forward temperature-coefficient-of-resistance heating element 4 and a radiator 5 by both sides of the thickness direction.

[0016]

[Effect of the Invention] As the example explained above, the warm air generator using the forward temperature-coefficient-of-resistance heating element of this invention The thin forward temperature-coefficient-of-resistance resistor which

consists of conductive impalpable powder and a crystalline polymer, The electrode of the pair prepared in the thickness direction of said forward temperature-coefficient-of-resistance resistor that an electrical potential difference should be impressed, The forward temperature-coefficient-of-resistance heating element equipped with the insulating layer which seals the terminal for electric supply, and said forward temperature-coefficient-of-resistance resistor, said electrode and said terminal for electric supply to said electrode, The radiator thermally combined with said forward temperature-coefficient-of-resistance heating element, and the duct which installs said forward temperature-coefficient-of-resistance heating element and said radiator inside, and forms an air course, It has ventilation equipment which ventilates said duct, and said forward temperature-coefficient-of-resistance heating element is arranged in parallel at a wind. For association with said forward temperature-coefficient-of-resistance heating element and said radiator Since it is the configuration characterized by using the fixing component which pierces through the insulating layer in which said forward temperature-coefficient-of-resistance resistor of the binder between said forward temperature-coefficient-of-resistance heating elements and said radiators and the windward of said forward temperature-coefficient-of-resistance heating element, said electrode, and said terminal for electric supply do not exist, and said radiator, and is fixed A binder absorbs deformation by the heat expansion and contraction of the forward temperature-coefficient-of-resistance heating element itself accompanying high power. Without being the part which does not almost have deformation by heat expansion and contraction of a windward of the forward temperature-coefficient-of-resistance heating element itself, and fixing in the part which exfoliation by the wind begins to generate, and exfoliating, generating of distortion by the forward temperature-coefficient-of-resistance resistor can be prevented, it is long lasting and safety also increases.

[0017] Furthermore, since it can absorb horizontally with the hole which prepared heat expansion and contraction of some of a forward temperature-coefficient-of-

resistance heating element in the radiator since fixing components are the configuration which can be pierced through an insulating layer, and the quality of the material and it is the configuration which prepared the bigger hole than the cross section of a fixing component in the radiator, and was fixed by both sides of the thickness direction of said insulating layer and said radiator, and it fixes by both sides of the thickness direction of said insulating layer and said radiator, it does not exfoliate.

[0018] Furthermore, since a fixing component can be pierced through an insulating layer, after not opening a hole in an insulating layer and setting the hole of an insulating layer and a radiator, a troublesome process is less necessary on the mass production of equipping with a fixing component. That is, not only raising dependability but it is very effective practically.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] (a) The side-face sectional view of the warm air generator of one example of this invention

(b) The enlarged drawing of this side-face cross section

[Drawing 2] The perspective view of the heating element unit of this warm air generator

[Drawing 3] The sectional view of the fixed part of the heating element unit of this warm air generator

[Drawing 4] The front view of the heating element unit configuration of this warm air generator

[Drawing 5] The perspective view of the forward temperature-coefficient-of-resistance heating element of this warm air generator

[Drawing 6] The perspective view of the forward temperature-coefficient-of-resistance heating element of the conventional example

[Drawing 7] The perspective view of the heating element unit of the conventional example

[Description of Notations]

1 Two Electrode

3 Forward Temperature-Coefficient-of-Resistance Resistor

4 Forward Temperature-Coefficient-of-Resistance Heating Element

5 Radiator

6 Epoxy System Resin

7 Binder

8 Fixing Component

9 Duct

10 Ventilation Equipment

11 12 Terminal for electric supply

13 14 Insulating layer

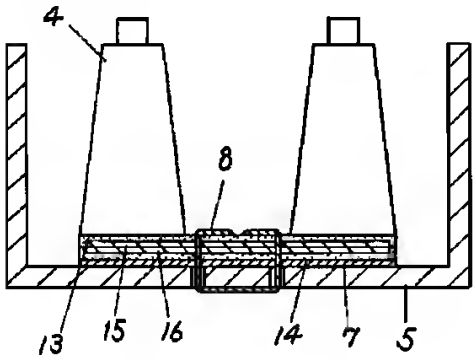
15 16 Hot melt layer

[Translation done.]

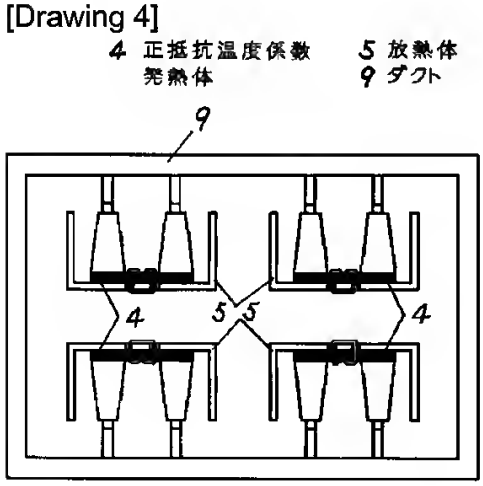
* NOTICES *

DRAWINGS

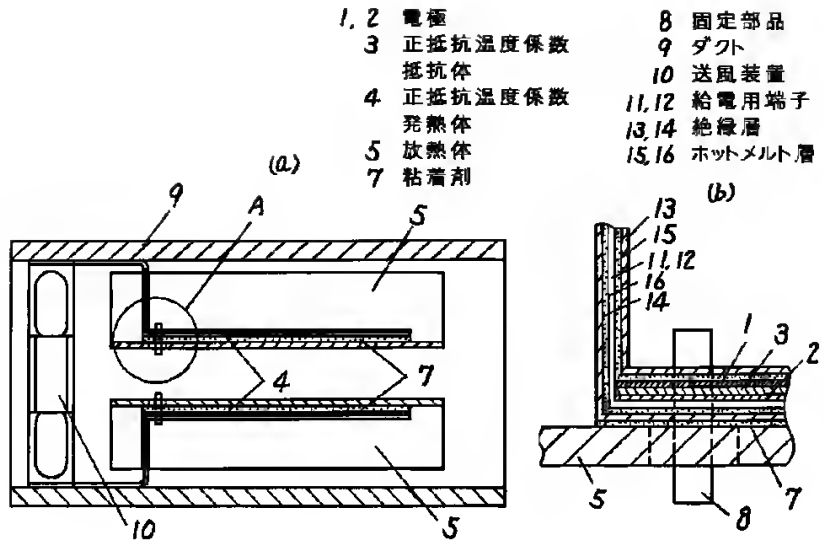
[Drawing 3]



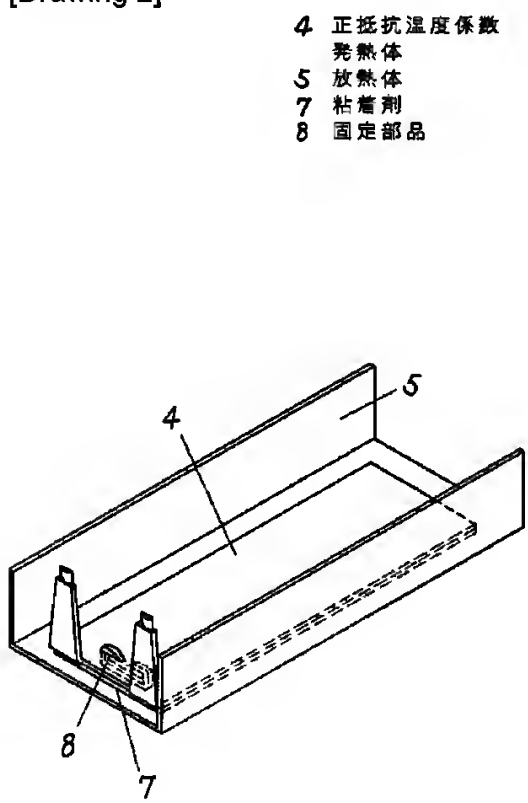
[Drawing 4]



[Drawing 1]

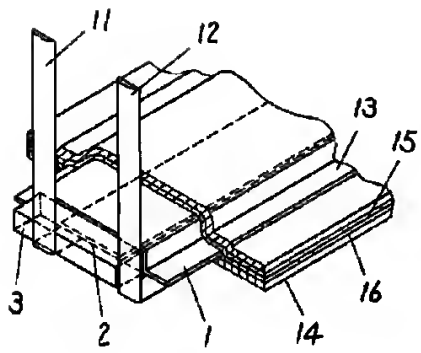


[Drawing 2]



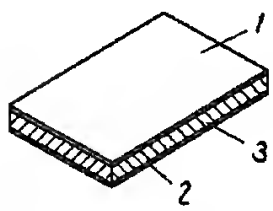
[Drawing 5]

1, 2 電極
3 正抵抗温度係数抵抗体
4 正抵抗温度係数発熱体
11, 12 給電用端子
13, 14 絶縁層
15, 16 ホットメルト層

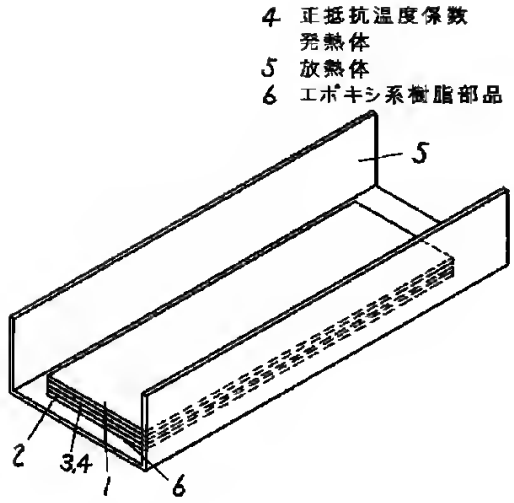


[Drawing 6]

1, 2 電極
3 正抵抗温度係数抵抗体



[Drawing 7]



[Translation done.]

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(71)出願人　000005821
松下電器産業株式会社
大阪府門真市大字門真1006番地

(72)発明者　吉本　弘次
大阪府門真市大字門真1006番地　松下電器産業株式会社内

(72)発明者　石井　和典
大阪府門真市大字門真1006番地　松下電器産業株式会社内

(72)発明者　寺門　誠之
大阪府門真市大字門真1006番地　松下電器産業株式会社内

(74)代理人　弁理士　小鍜治　明　(外２名)

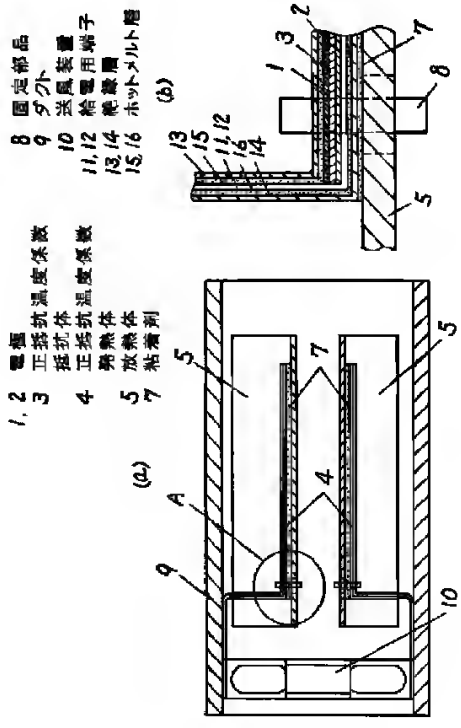
最終頁に続く

(54)【発明の名称】　温風発生装置

(57)【要約】

【目的】　正抵抗温度係数（以下ＰＴＣ）発熱体の熱膨脹及び収縮に伴う、歪みの発生を防止し、長寿命で、安全なＰＴＣ発熱体を用いた温風発生装置を提供する。

【構成】　薄型のＰＴＣ抵抗体と、この厚さ方向に電圧を印加すべく設けられた一対の電極１，２と、給電用端子１１，１２と、これらを密封する絶縁層１３，１４とを備えた長尺のＰＴＣ発熱体４と、これに粘着剤７と、風上側の絶縁層１３，１４と放熱体５を貫き固定する固定部品８を用い結合した放熱体５と、これらを内設するダクト９と、これに送風する送風装置１０とを備え、前記長尺のＰＴＣ発熱体４は風向きに並行に配置され、さらに、放熱体５には絶縁層１３，１４を貫くことの可能な固定部品８が貫通する部分の断面より大きな孔を設け、前記絶縁層１３，１４と前記放熱体５の厚さ方向の両面で固定部品８により固定した。



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【特許請求の範囲】

【請求項1】　導電性微粉末と結晶性重合体よりなる正抵抗温度係数抵抗体と、前記正抵抗温度係数抵抗体の厚さ方向に電圧を印加すべく設けられた一対の電極と、前記電極への給電用端子と、前記正抵抗温度係数抵抗体及び前記電極及び前記給電用端子を密封する絶縁層とを備えた正抵抗温度係数発熱体と、前記正抵抗温度係数発熱体に結合した放熱体と、前記正抵抗温度係数発熱体及び前記放熱体を内設して風路を形成するダクトと、前記ダクトの一端から送風する送風装置とを備え、前記正抵抗温度係数発熱体は風向きに並行に配置され、前記正抵抗温度係数発熱体と前記放熱体との結合には、前記正抵抗温度係数発熱体と前記放熱体との間の粘着剤と、前記正抵抗温度係数発熱体の風上側の前記正抵抗温度係数抵抗体及び前記電極及び前記給電用端子の存在しない絶縁層と前記放熱体を貫き固定する固定部品を用いた温風発生装置。

【請求項2】　固定部品は絶縁層を貫くことが可能である形状及び材質であり、放熱体には前記固定部品が貫通する部分の断面より大きな孔を設け、前記絶縁層と前記放熱体の厚さ方向の両面で固定した請求項1記載の温風発生装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は正抵抗温度係数発熱体を熱源として用いた温風発生装置に関し、特にこの正抵抗温度係数発熱体と放熱体との結合構成に係るものである。

【0002】

【従来の技術】従来の正抵抗温度係数発熱体は、例えば特公昭57－43995号公報や特公昭55－40161号公報に示されているような構成であり、一対の電極間の抵抗体の正抵抗温度特性により、適宜な温度に自己制御されているものであった。しかし、特に大きな電力密度や高温度が要求される場合においては、正抵抗温度係数発熱体自体の温度分布を一様にし、ホットゾーンの発生等の異常を防止するために、一対の電極間方向の温度分布を常に良好にすることが不可欠である。

【0003】その解決策として特公昭62－59515号公報や図6に示すように一対の電極間距離を互いに接近させて構成する方法が講じられた。図6において、1，2は互いに接近して設けられた一対の電極であり、この間に結晶性重合体に導電性微粉末を混合分散して形成した正抵抗温度係数抵抗体3を配設することにより高出力の正抵抗温度係数発熱体4を得られる可能性が見出されている。これを図7に示すように放熱体5にエポキシ系樹脂6等で熱的に結合することにより、出力される大量の熱を効率的に放熱させることができ、なおかつ剥離する恐れもなかった。

【0004】

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【発明が解決しようとする課題】しかしながら上記従来の構成では、正抵抗温度係数発熱体4が放熱体5に完全に固着された状態であり、高出力に伴う正抵抗温度係数発熱体自体の熱膨脹及び収縮により、正抵抗温度係数抵抗体3に歪みが発生し、この歪みによりホットゾーン等の異常が発生したり、抵抗が劣化していき、寿命低下したり、異常過熱・発熱等を発生することもあった。

【0005】本発明は上記課題を解決するもので、正抵抗温度係数発熱体自体の熱膨脹及び収縮による正抵抗温度係数抵抗体への歪みの発生を防止し、長寿命で、安全な正抵抗温度係数発熱体を用いた温風発生装置を提供することを目的としたものである。

【0006】

【課題を解決するための手段】本発明は上記目的を達成するため、導電性微粉末と結晶性重合体よりなる正抵抗温度係数抵抗体と、前記正抵抗温度係数抵抗体の厚さ方向に電圧を印加すべく設けられた一対の電極と、前記電極への給電用端子と、前記正抵抗温度係数抵抗体及び前記電極及び前記給電用端子を密封する絶縁層とを備えた長尺の正抵抗温度係数発熱体と、前記正抵抗温度係数発熱体に結合した放熱体と、前記正抵抗温度係数発熱体及び前記放熱体を内設して風路を形成するダクトと、前記ダクトの一端から送風する送風装置とを備え、前記正抵抗温度係数発熱体は風向きに並行に配置され、前記正抵抗温度係数発熱体と前記放熱体との結合には、前記正抵抗温度係数発熱体と前記放熱体との間の粘着剤と、前記正抵抗温度係数発熱体の風上側の前記正抵抗温度係数抵抗体及び前記電極及び前記給電用端子の存在しない絶縁層と前記放熱体を貫き固定する固定部品を用いたことを特徴とする構成である。

【0007】さらに、固定部品は絶縁層を貫くことが可能である形状及び材質であり、放熱体には前記固定部品が貫通する部分の断面より大きな孔を設け、前記絶縁層と前記放熱体の厚さ方向の両端で固定したものである。

【0008】

【作用】本発明は正抵抗温度係数発熱体が風向きに並行に配置され、正抵抗温度係数発熱体と放熱体との結合に、正抵抗温度係数発熱体と放熱体との間の粘着剤と、絶縁層と放熱体を貫き固定する固定部品を用いたことにより、正抵抗温度係数発熱体自体の熱膨脹及び収縮による変形を粘着剤が吸収し、風上側の正抵抗温度係数発熱体自体の熱膨脹及び収縮による変形がほとんどない部分であり、かつ風による剥離が発生し始める部分は固定してあるので、剥離することもなく、正抵抗温度係数抵抗体の歪みの発生を防止する。

【0009】さらに、固定部品は絶縁層を貫く形状及び材質であり、放熱体には固定部品が貫通する部分の断面より大きな孔を設け、前記絶縁層と前記放熱体の厚さ方向の両面で固定した構成のため、多少の正抵抗温度係数発熱体の熱膨脹及び収縮は、放熱体に設けた孔で水平方

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向に吸収することができ、前記絶縁層と前記放熱体を厚さ方向の両面で固定するので剥離することがない。

【0010】

【実施例】以下本発明の一実施例を図面を参照して説明する。本実施例の温風発生装置は、例えば、図2の斜視図及び図3の正面断面図に示すような発熱体ユニットを有し、図4の正面図に示すような発熱体ユニット構成であり、図1の断面図に示すような温風発生装置である。図2，3において、4は長さ400mmの長尺の正抵抗温度係数発熱体であり、アルミニウム材よりなる放熱体5に粘着剤7で結合し、風上側の正抵抗温度係数発熱体4自体の熱膨脹及び収縮による変形がほとんどない部分で固定部品8により固定して発熱体ユニットを構成する。図4，1に示すようにこの発熱体ユニットを2段2列に構成してダクト9内に配設し、この正抵抗温度係数発熱体4に一端より送風装置10により、送風し温風を得るものである。なお、各正抵抗温度係数発熱体4は電気的に並列接続される。

【0011】上記構成において、正抵抗温度係数発熱体4は図5に示すような構造で、導電性微粉末としてファーネスカーボンブラックを、結晶性重合体として高密度ポリエチレンを用い、次のように加工して作成した。まず、ファーネス系カーボンブラック55wt％と高密度ポリエチレン45wt％とを混練しつつ、有機過酸化物であるジクミールパーオキサイトを高密度ポリエチレンに対して3wt％添加し、熱処理を施すことによって架橋反応を完了させた後に、冷凍粉砕によって、平均粒径50μmの粉砕物を得た。この粉砕物を高密度ポリエチレン中に均一分散し、カーボンブラック組成比が全量の35．5wt％になるように、十分に混練し、抵抗体ペレットを得た。こうして得た抵抗体ペレットを厚さ0．4mmの薄型に加工し、正抵抗温度係数抵抗体3を成形し、その厚さ方向に印可すべく設けられた一対の電極1，2を構成し、これら電極1，2に給電用端子11，12を各3点でスポット溶接し、さらに、この正抵抗温度係数抵抗体3及び電極1，2及び給電用端子11，12との一体化体を50μm厚さのポリエステルフィルムよりなる絶縁層13，14で被覆、密封し、この後に、図1に示すように、放熱体5に粘着剤7により貼り付け，風上側の正抵抗温度係数発熱体4自体の熱膨脹及び収縮による変形がほとんどない部分を固定部品8により固定して発熱体ユニットを構成し、長尺の正抵抗温度係数発熱体4が風向きに並行に配置するように温風発生装置を構成させた。

【0012】この実施例の構成によれば、正抵抗温度係数発熱体4はカーボン－樹脂系なので、給電部分が複雑にならず、可撓性もあり、正抵抗温度係数発熱体4装架も容易であり、さらに、一対の電極1，2間距離が互いに接近して構成されているため、一対の電極1，2間方向の温度分布が常に良くなり、正抵抗温度係数発熱体4の出力をかなり高めることができ、有効発熱投影面積当たり約13W／cm²（通電初期時）という高出力値まで得ることができた。そして、図1に示すように、長尺の正抵抗温度係数発熱体4が風向きに並行に配置され、正抵抗温度係数発熱体4と放熱体5との結合に、正抵抗温度係数発熱体4と放熱体5との間の粘着剤7と、前記正抵抗温度係数発熱体4の風上側の絶縁層13，14と放熱体5を貫き固定する固定部品8を用いたことにより、高出力に伴う正抵抗温度係数発熱体4自体の熱膨脹及び収縮による変形を粘着剤7が吸収し、風上側の温度変化の少ない部分、つまり、正抵抗温度係数発熱体4自体の熱膨脹及び収縮による変形がほとんどない部分で固定しており、正抵抗温度係数抵抗体3への歪みの発生を防止し、剥離することなく、長寿命で安全な正抵抗温度係数発熱体4を用いた温風発生装置を提供することができる。

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【0013】また、正抵抗温度係数発熱体4全体を絶縁層13，14で被覆することにより、電気絶縁面積を正抵抗温度係数発熱体4部分だけにすることができ、感電・漏電等に対する安全性を高めることができる。なお、絶縁層13，14については、ホットメルト層15，16を有したもので、このホットメルト層15，16で上下溶着し、密封するものがよい。

【0014】実際に、この温風発生装置を室温10℃の部屋で通電してみた。通電突入時には約2000Wの電力が入り、通電してから約10秒後には、約1500Wとなり、温風温度が45℃を越え、暖かさを感じるに至り、1分後には、電力が827W、温風温度が69℃となり、十分に暖かくなるに至った。最終的には、温風温度が73℃、電力が730Wで安定したが、この時の正抵抗温度係数発熱体4の温度は100℃程度に自己温度制御されており、この状態では、風量が変化しても、風速分布がばらついても、ダクト9内の温度は100℃以上に上昇することなく、風量、風速に追従した電力分布で均一な温度の温風を発生させるものであり、きわめて安全である。

【0015】また、固定部品8は、図1～4に示すように、本実施例ではコの字型の金属針を用い、この金属針の並行する2本の金属針の先端は絶縁層13，14を貫くことが可能な鋭利な形状とし、放熱体5には金属針の断面より大きな孔を設け、金属針の両端に折り曲げ部のある金属針が放熱体5（もしくは絶縁層13，14）に密着した状態で、金属針を絶縁層13，14（もしくは放熱体5）に沿い折り曲げて正抵抗温度係数発熱体4と放熱体5を固定する構成にすれば、多少の正抵抗温度係数発熱体4の熱膨脹及び収縮は放熱体5に設けた孔で水平方向に吸収することができ、絶縁層13，14と放熱体5を厚さ方向の両面で固定しているので剥離することはない。さらに、固定部品8の金属針の先端の形状は鋭利で絶縁層13，14を貫くことが可能であるため、絶

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縁層１３，１４に孔を開けておく必要がなく、絶縁層１３，１４と放熱体５の孔を合わせてから固定部品８を装着するという量産上面倒な工程は必要なくなる。なお、このことはコの字型の金属針でなくても、絶縁層１３，１４を貫き正抵抗温度係数発熱体４と放熱体５を厚さ方向の両面で固定することが可能な固定部品８であれば良いことはいうまでもない。

【００１６】

【発明の効果】以上実施例で説明したように、本発明の正抵抗温度係数発熱体を用いた温風発生装置は、導電性微粉末と結晶性重合体よりなる薄型の正抵抗温度係数抵抗体と、前記正抵抗温度係数抵抗体の厚さ方向に電圧を印加すべく設けられた一対の電極と、前記電極への給電用端子と、前記正抵抗温度係数抵抗体及び前記電極及び前記給電用端子を密封する絶縁層とを備えた正抵抗温度係数発熱体と、前記正抵抗温度係数発熱体に熱的に結合した放熱体と、前記正抵抗温度係数発熱体及び前記放熱体を内設して風路を形成するダクトと、前記ダクトに送風する送風装置とを備え、前記正抵抗温度係数発熱体は風向きに並行に配置され、前記正抵抗温度係数発熱体と前記放熱体との結合には、前記正抵抗温度係数発熱体と前記放熱体との間の粘着剤と、前記正抵抗温度係数発熱体の風上側の前記正抵抗温度係数抵抗体及び前記電極及び前記給電用端子の存在しない絶縁層と前記放熱体を貫き固定する固定部品を用いたことを特徴とする構成であるので、高出力に伴う正抵抗温度係数発熱体自体の熱膨脹及び収縮による変形を粘着剤が吸収し、風上側の正抵抗温度係数発熱体自体の熱膨脹及び収縮による変形がほとんどない部分であり、かつ風による剥離が発生し始める部分で固定しており、剥離することもなく、正抵抗温度係数抵抗体への歪みの発生を防止でき、長寿命で、安全性も高まる。

【００１７】さらに、固定部品は絶縁層を貫くことが可能である形状及び材質であり、放熱体には固定部品の断面より大きな孔を設け、前記絶縁層と前記放熱体の厚さ

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方向の両面で固定した構成であるので、多少の正抵抗温度係数発熱体の熱膨脹及び収縮は、放熱体に設けた孔で水平方向に吸収することができ、前記絶縁層と前記放熱体の厚さ方向の両面で固定するので剥離することがない。

【００１８】さらに、固定部品は絶縁層を貫くことが可能であるため、絶縁層に孔を開けておく必要がなく、絶縁層と放熱体の孔を合わせてから固定部品を装着するという量産上面倒な工程は必要でなくなる。つまり、信頼性を上げるだけでなく、実用上非常に有効でもある。

【図面の簡単な説明】

【図１】（ａ）本発明の一実施例の温風発生装置の側面断面図

（ｂ）同側面断面の拡大図

【図２】同温風発生装置の発熱体ユニットの斜視図

【図３】同温風発生装置の発熱体ユニットの固定部の断面図

【図４】同温風発生装置の発熱体ユニット構成の正面図

【図５】同温風発生装置の正抵抗温度係数発熱体の斜視図

【図６】従来例の正抵抗温度係数発熱体の斜視図

【図７】従来例の発熱体ユニットの斜視図

【符号の説明】

１，２　電極

３　正抵抗温度係数抵抗体

４　正抵抗温度係数発熱体

５　放熱体

６　エポキシ系樹脂

７　粘着剤

８　固定部品

９　ダクト

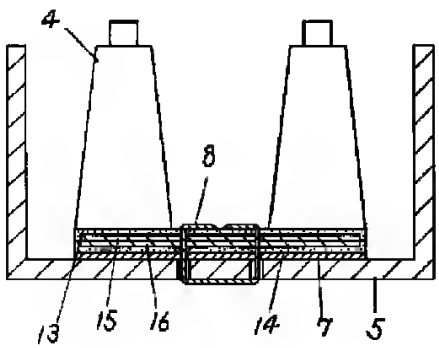
１０　送風装置

１１，１２　給電用端子

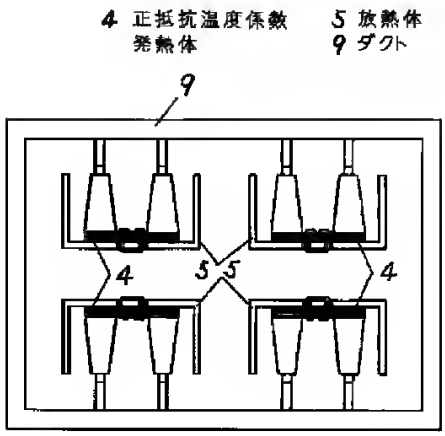
１３，１４　絶縁層

１５，１６　ホットメルト層

【図３】

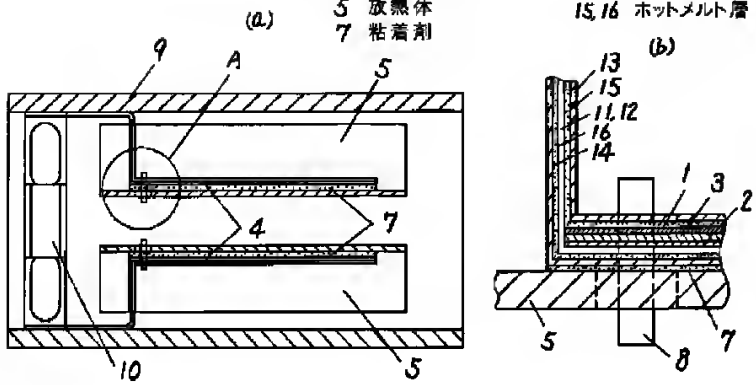


【図４】



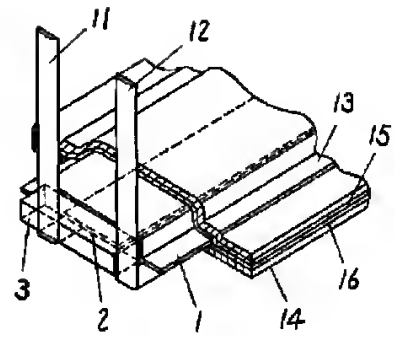
【図1】

1, 2 電極
3 正抵抗温度係数抵抗体
4 正抵抗温度係数発熱体
5 放熱体
7 粘着剤
8 固定部品
9 ダクト
10 送風装置
11, 12 給電用端子
13, 14 絶縁層
15, 16 ホットメルト層



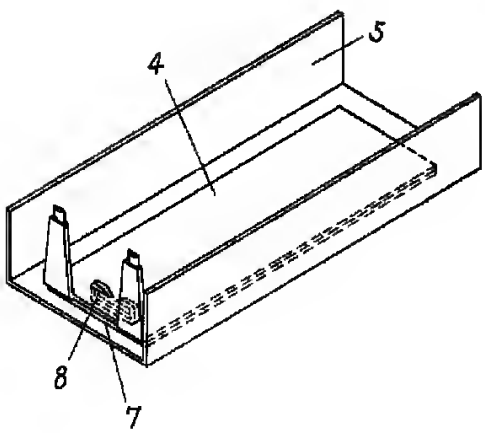
【図5】

1, 2 電極
3 正抵抗温度係数抵抗体
4 正抵抗温度係数発熱体
11, 12 給電用端子
13, 14 絶縁層
15, 16 ホットメルト層



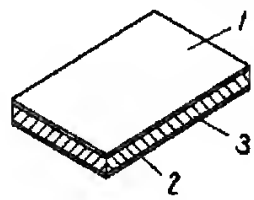
【図2】

4 正抵抗温度係数発熱体
5 放熱体
7 粘着剤
8 固定部品



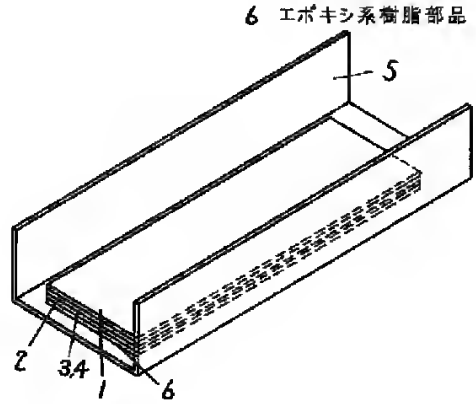
【図6】

1, 2 電極
3 正抵抗温度係数抵抗体



【図7】

4 正抵抗温度係数発熱体
5 放熱体
6 エポキシ系樹脂部品



フロントページの続き

(72)発明者　林　武史
大阪府門真市大字門真1006番地　松下電器
産業株式会社内